



MAINTENANCE INSTRUCTIONS

STANDARD REDUCERS SERIES 133, 175, 206, 262, 325

INDEX

	Page
Introduction	1
Equipment Required	1
General Instructions	1
Housings	1
Seals	1
To Change Output Shaft Direction	1
Unit Disassembly, Parts Service, and Reassembly	1
Disassembly	1
Low Speed Shaft Removal	1
High Speed Shaft Removal	1, 2
Parts Service	2
Housing	2
Seal Cages and End Cover	2
Air Vent	2
Seals	2
Bearings	2, 3
Worm Gear and Shaft	3
Unit Reassembly	3
High Speed Shaft Assembly	4
Low Speed Shaft Assembly	4
Preventive Maintenance	4
Stored and Inactive Units	5
Parts Ordering Instructions	5
Exploded Views	7, 8
Parts List	9
Warranty	9
	Back Cover

MAINTENANCE INSTRUCTIONS FOR STANDARD REDUCERS

Series 133, 175, 206, 262 and 325

INTRODUCTION

The following instructions apply to standard Worm Gear Reducers. When ordering parts or requesting information specify all information stamped on the reducer nameplate. The nameplate will also identify the type of lubricant to be used.

EQUIPMENT REQUIRED

In addition to standard mechanic's tools, the following equipment is required: arbor press, wheel puller, torque wrench, dial indicator, seal driver, bluing, Permatex No. 2 and Permatex No. 3, snap ring pliers for internal and external rings.

GENERAL INSTRUCTIONS

Housings — Clean external surfaces of reducer before removing seal cages and end covers to prevent dirt from falling into the unit. Record mounting dimensions of accessories for reference when reassembling. If it is necessary to remove the reducer from its operating area, disconnect all connected equipment and lift reducer from its foundation.

Seals — Replacement of all seals is recommended when a unit is disassembled. However, if seals are not to be replaced, protect seal life by wrapping shaft with thin, strong paper coated with oil or grease before removing or replacing seal case assembly. Clean the shaft but do not use any abrasive material on the shaft surface polished by the seal.

CAUTION

If the reducer is painted, extreme care should be taken to mask the shaft extensions and rubber surface of the seals. Paint on the shaft adjacent to the seal or on the seal lip will cause oil leakage.

TO CHANGE OUTPUT SHAFT DIRECTION

To change the hand of a unit from left hand to right hand, or vice versa, the following instructions apply:

1. Remove drain plug and drain oil from unit.
2. Remove end cover and seal cage cap screws; then while supporting output shaft remove end cover and shims from the unit.
3. Remove output shaft and seal cage together from extension side.

NOTE: Keep shims with their respective seal cage and end cover.

4. Insert seal cage, shims and sub-assembly into the housing from the side opposite from which they were removed. Insert seal cage cap screws and tighten with light pressure.
5. Assemble end cover and shims. Insert end cover cap screws and tighten with light pressure.
6. Turn high speed shaft in both directions to see that gear train is running freely.
7. Cross tighten seal cage and end cover cap screws to torques listed in Table 1.

TABLE 1. CAPSCREW TIGHTENING TORQUE

Capscrew Diameter	1/4 - 20 UNC	5/16 - 18 UNC	3/8 - 16 UNC
Torque (in. lbs.) Dry	96	204	360

UNIT DISASSEMBLY, PARTS SERVICE, AND ASSEMBLY

Disassembly:

1. Remove drain plug and drain oil from unit.
2. Low speed shaft (gear shaft) removal:
 - A. Remove end cover and seal cage cap screws.
 - B. With a firm hold on the output extension remove end cover and shims.
 - C. Carefully slide output shaft assembly and seal cage out extension side.
 - D. Slide seal cage off low speed shaft using caution to prevent damage to seal lips.
 - E. Wire or tie the shims to their mating end cover and seal cages. They will be available for reference when assembling the unit.
3. High speed shaft (worm shaft) removal:
 - A. Position unit with input shaft vertical. Use a small chisel make a groove in the stamped steel cover opposite the shaft extension. Hit with a hammer.

- B. Remove internal snap ring from housing bore.
- C. Reposition the housing with the worm shaft horizontal. Using a plastic hammer gently tap on the end of the shaft extension to feed worm shaft assembly through housing and out.

Parts Service:

1. **Housing** — Clean inside of housing with kerosene or solvent and then dry.
2. **Seal cages and end cover** — Remove dirt from joint faces, wipe clean and dry.
3. **Air vent** — Wash in kerosene, blow clean and dry.
4. **Seals** — To replace seals without dismantling reducer refer to steps C through F below. To replace seals when the entire reducer is dismantled and coupling hubs, sprockets, pulleys, pinions, keys, etc. have been removed the following instructions apply:

NOTE: Replacement of all seals is recommended when a unit is disassembled.

Caution

New seals will leak if the seal lips or if seal's rubbing surface on the shaft has been altered. Protect seal lips at all times. Clean the shaft but do not use any abrasive material on the shaft surface polished by the seal.

- A. Block up seal cages and press or drive out seal.
- B. Remove old sealing compound from seal seat in cage if it is present. If a seal with rubber coating on the outside diameter is used, no Permatex is necessary. If no rubber coating is on seal outside diameter, coat seal cage bore with Permatex No. 3 or equivalent immediately before assembly. To prevent possible damage to seal lips, do not reassemble seals until high speed and low speed shafts have been reassembled to the housing. Then see steps E and F below.
- C. See Figures 1 through 4—To replace seals without dismantling reducer, proceed as follows:

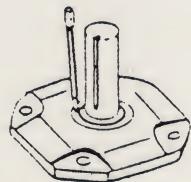


Figure 1

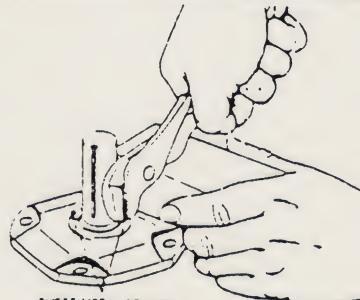


Figure 2

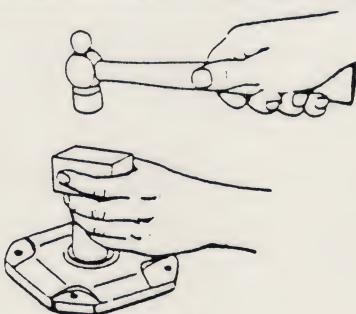


Figure 3

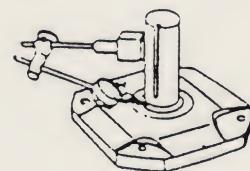


Figure 4

Caution

Do not damage shaft; new seals will leak if seal contacting surface is marred. Use punch and place two or more holes in steel casing of seal. Figure 1. (The steel casing may be rubber coated) Insert sheet metal screws, leaving the heads sufficiently exposed so they can be pried up or grasped with pliers, Figure 2. Do not drill holes because chips may get into the unit.

D. Work seal loose. Be careful to keep all metal or dirt particles from entering unit. Remove old sealing compound from seal seat if it is present. Also remove burrs and sharp edges from shaft. Clean with rag moistened with solvent. Do not use abrasive material on shaft seal contacting surface.

Caution

E. Protect seal lips when handling; seal leakage will result if these are damaged. If a seal with rubber coating on the outside diameter (O.D.) is used, no Permatex is necessary. If no rubber coating is on seal O.D., coat seal cage bore with Permatex No. 3 or equivalent. Coat seal lips with oil and carefully work seal into position. Before sliding seal into position, protect seal lips from shaft keyway edges by wrapping shaft with thin, strong paper coated with oil. Position garter spring toward the inside of the unit. Place a square faced pipe or tube against the seal O.D. and drive or press seal until fully seated as shown in Figure 3. Do not strike seal directly.

F. For best performance, seat the seal square with shaft within .005" at 180°. Check with dial indicator as shown in Figure 4, Page 2, or with a straight edge and feelers, or square and feelers. To straighten a cocked seal, place tubing over the seal and tap the tube lightly at a point diametrically opposite the low point on the seal. DO NOT strike seal directly.

5. **Bearings —**

- A. Wash all bearings in clean kerosene and then dry.
- B. Inspect bearings carefully and replace those that are worn or questionable.
NOTE: Replacement of all bearings is recommended.
- C. Use a wheel puller or press to remove worm shaft bearings. Apply force to inner race only — not to cage or outer race.
- D. Use a wheel puller or press to remove output bearing inner races.
- E. New seal cages and end covers must be used when replacing output bearings. Output bearing outer races must be pressed in square and seated completely.
- F. To replace output bearing inner races and all input bearings, heat bearings in an oil bath or oven to maximum of 290 degrees F (143 degrees C). Slide high speed shaft bearings onto the oiled shaft until seated against the shoulder or snap ring of the shaft. Slide low speed shaft bearings onto the oiled shaft against the gear spacer.
- G. Thoroughly coat all bearings with lubricating oil.

6. **Worm, gear and shafts**

- A. Worm and high speed shaft—since all worms are integral with the high speed shaft, any wear or damage to the worm will necessitate replacing both.
- B. Press shaft out of bronze worm gear. To reassemble gear and low speed shaft, freeze shaft or heat gear. Do not exceed 200 degrees F (93 degrees C). Insert key into shaft keyway and press shaft into oiled gear bore. The short hub of the gear must be assembled toward snap ring on the shaft.

NOTE: It is advisable to replace both the worm and worm gear should either of the assemblies require replacement.

Unit Reassembly:

1. Preliminary

- A. Check to see that all worn parts have been replaced, gear and bearings coated with oil and all parts cleaned. Remove all foreign matter from unit feet. The feet must be flat and square with each other.
- B. Before starting to reassemble reducer, add old shims or replace with new shims of equal thickness.

2. High Speed Shaft (Worm Shaft) Assembly

- A. Lubricate bearing bores of housing and insert high speed shaft sub-assembly from opposite extension end into housing until seated against shoulder in bore. Tap the end of the shaft lightly with a plastic hammer to feed bearings through bores.
- B. Lock high speed sub-assembly in housing bore with lock ring.
- C. Coat outside diameter of stamped steel end cover with Permatex No. 2 and press into high speed bore opposite extension end until flush with housing. If steel endcover is rubber coated then no Permatex is necessary.

3. Low Speed Shaft (Gear Shaft) Assembly

- A. Determine output shaft direction.
- B. Assemble low speed shaft assembly, seal cage, and end cover with shims on both seal cage and end cover. Torque cap screws to torques listed in Table 1. Rotate the input shaft to seat output bearings.
- C. Moving the shaft back and forth by hand, check axial float with dial indicator as shown in Figure 5. Axial float must be .0005-.003 with .0005 being the absolute minimum. Do not preload bearings. If the axial float is not as specified add or subtract required shims under end cover.

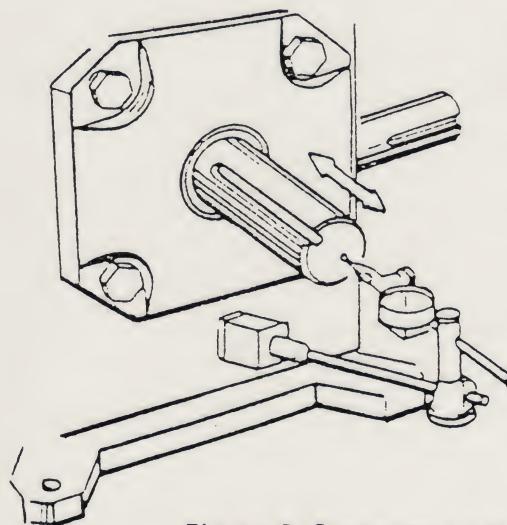


Figure 5 Checking Axial Float

- D. Remove output shaft with seal cage and apply bluing to entire worm thread. Worm thread must be clean of oil. Reassemble output shaft and seal cage with output key facing up.
- E. Use a rag to apply hand pressure to the output shaft and rotate the high speed shaft until output key is down. Return output shaft to original position by reversing rotation. Remove output shaft and seal cage to inspect contact. Compare with Figure 6. If contact is not correct move assembly in the direction shown in Figure 6 by adding shims to the side to which the arrow points after removing them from the opposite side. Repeat steps D and E until contact pattern is correct.
- F. Recheck axial float with dial indicator.
- G. When contact pattern is correct tighten seal cage and end cover cap screws to torques listed in Table 1 page 1.

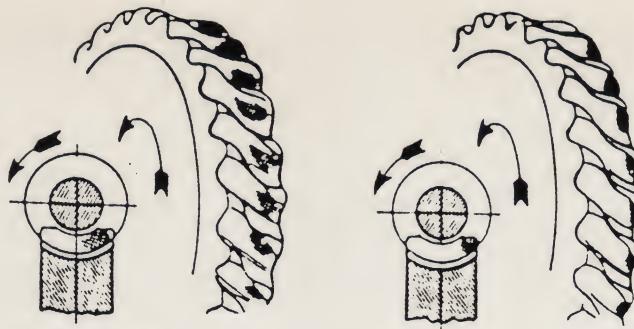


Figure 6 Gear Contact Pattern

seals to unit, see Parts Service Steps 4E and 4F, page 3.

apter

sions should be adhered to when removing motor and coupling assembly for replacement coupling halves (metal gear), specify correct bore diameter. See dimensions and available bore sizes.

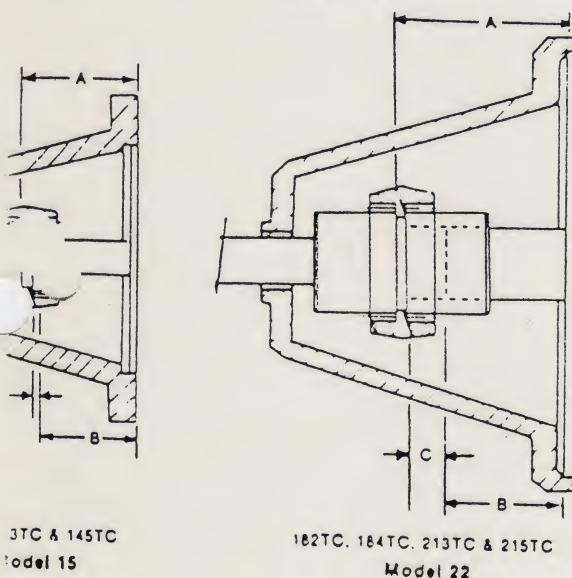


Figure 7 Motorized Coupling Adaptor

2. COUPLING ADAPTOR DATA

INTING DATA

g Dimensions	
Motor B $\pm \frac{1}{64}$	C
2 $\frac{1}{16}$	$\frac{1}{16}$
2 $\frac{1}{8}$	—
2 $\frac{5}{8}$	—
$\frac{5}{8}$	$\frac{1}{2}$
$\frac{1}{2}$	$\frac{1}{2}$
3 $\frac{1}{16}$	—
3 $\frac{3}{8}$	—

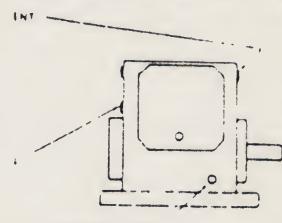
BORE SIZES AVAILABLE

MODEL 15		MODEL 22	
Bore	Kwy.	Bore	Kwy.
.500	None	—	—
.500	$\frac{1}{8} \times \frac{1}{16}$	—	—
.625	$\frac{3}{16} \times \frac{3}{32}$.625	$\frac{3}{16} \times \frac{3}{32}$
.750	$\frac{3}{16} \times \frac{3}{32}$.750	$\frac{3}{16} \times \frac{3}{32}$
.875	$\frac{3}{16} \times \frac{3}{32}$.875	$\frac{3}{16} \times \frac{3}{32}$
—	—	1.125	$\frac{1}{4} \times \frac{1}{16}$
—	—	1.375	$\frac{5}{16} \times \frac{5}{32}$

er. Failure to use special

. 8 for standard oil levels.

apid temperature rise.



ness.

ded. Do not fill above mark

/ six months or 2500 hours.

temperatures vary with the
fricant suppliers can test oil

od of 4 months in an outdoor
tory. Indoor dry storage is

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evel should be

pounds to your Doerr Electric
te parts, please provide the

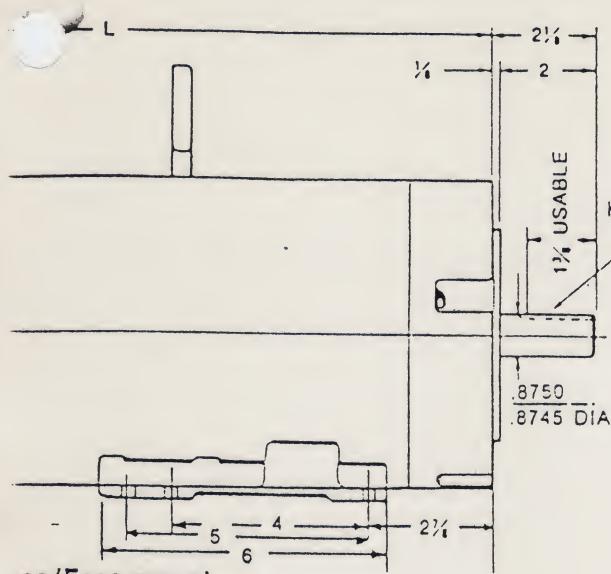
em number may refer to
se parts are

jh 3 above be provided when

g of your order.

S

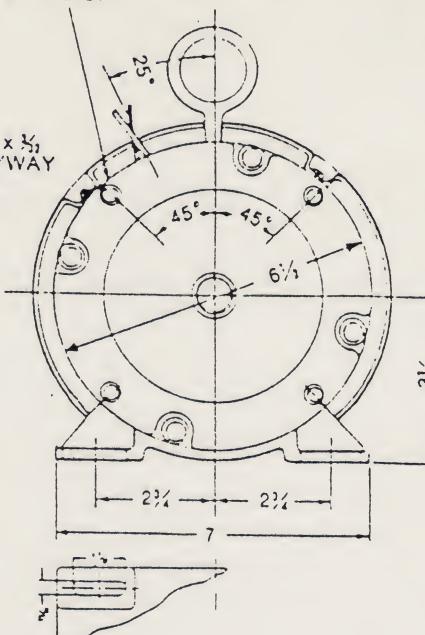
motor



Base/Face mount

3	L	1/2	1/2
2 1/2	15 1/2	CONT.	
5	16 1/2	CONT.	

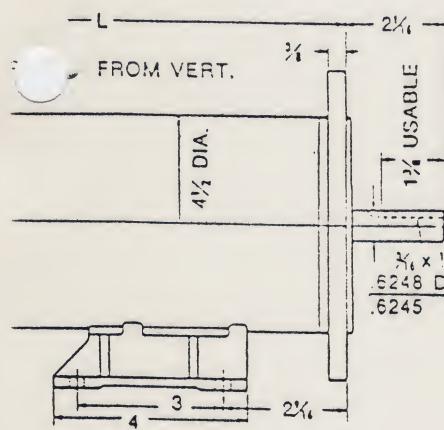
1/16 UNC - 2B TAP
1/4 IN. DEEP, 4 REQ'D. ON 5 8755
DIA. B.C.



UNIT SERIES
145 175 200 232 264

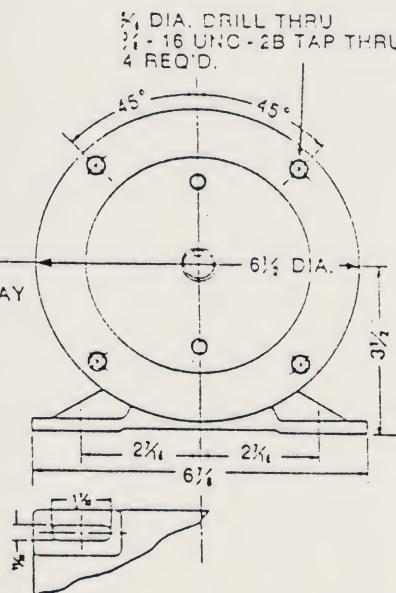
14	20	27	49	84
17	22	28	49	73
10	15	20	37	63
13	18	23	38	63

Approximate ounces. On double reduction capacity of both primary and secondary



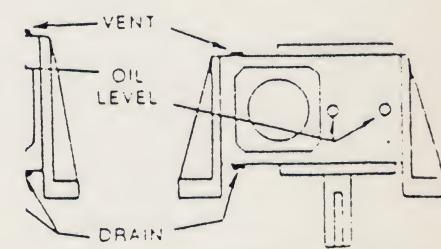
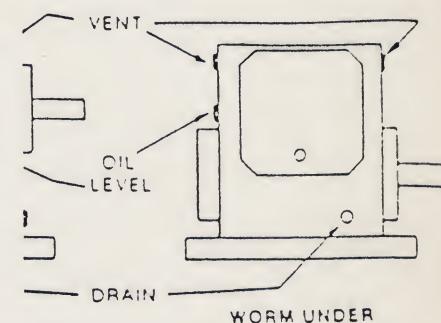
Base/Face mount

3	AMPS	L	1/2	1/2
2	2.8	10 3/4	CONT.	
2	3.5	12 3/4	CONT.	
2	5.35	14 3/4	CONT.	

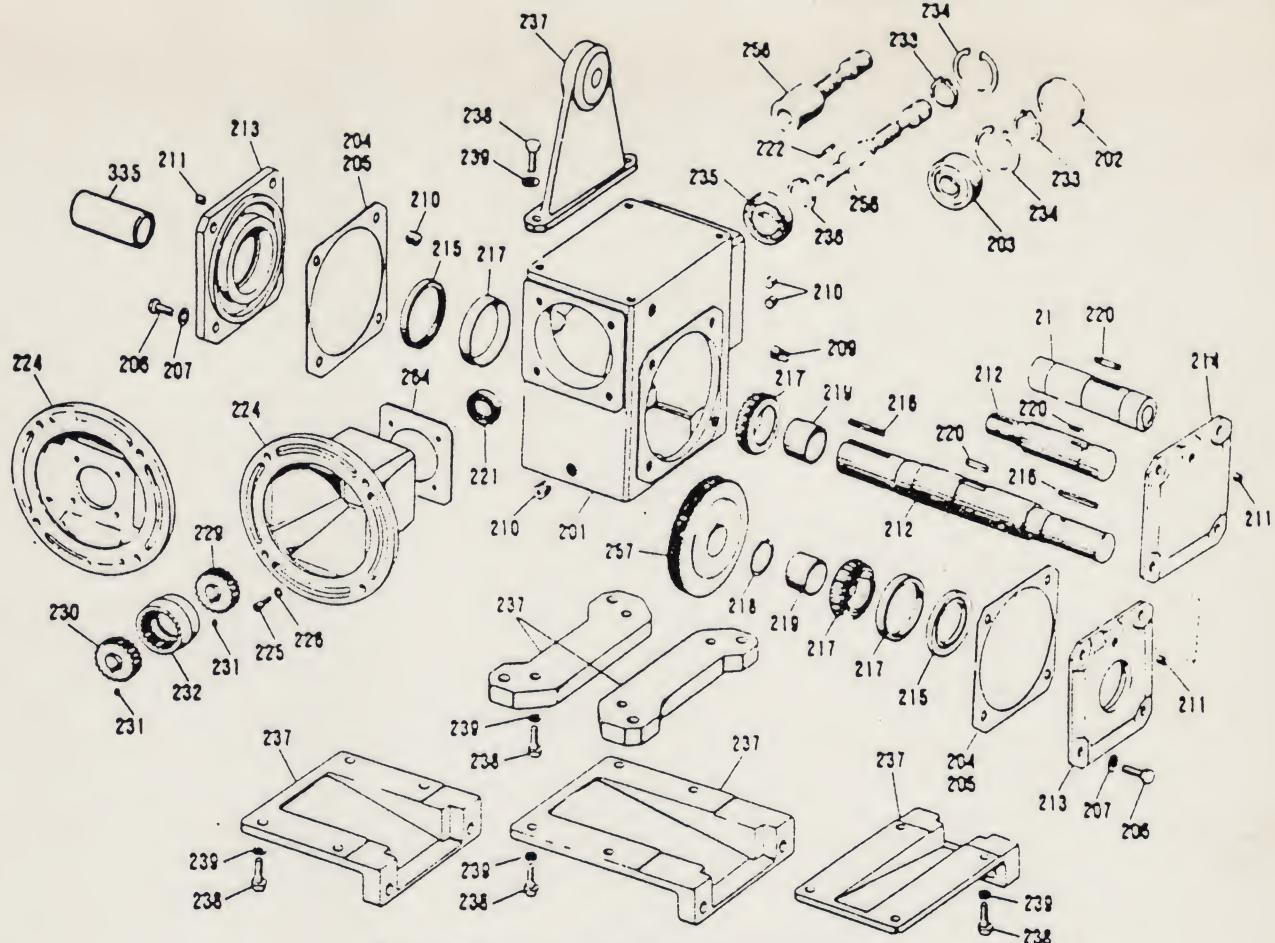


90 V.

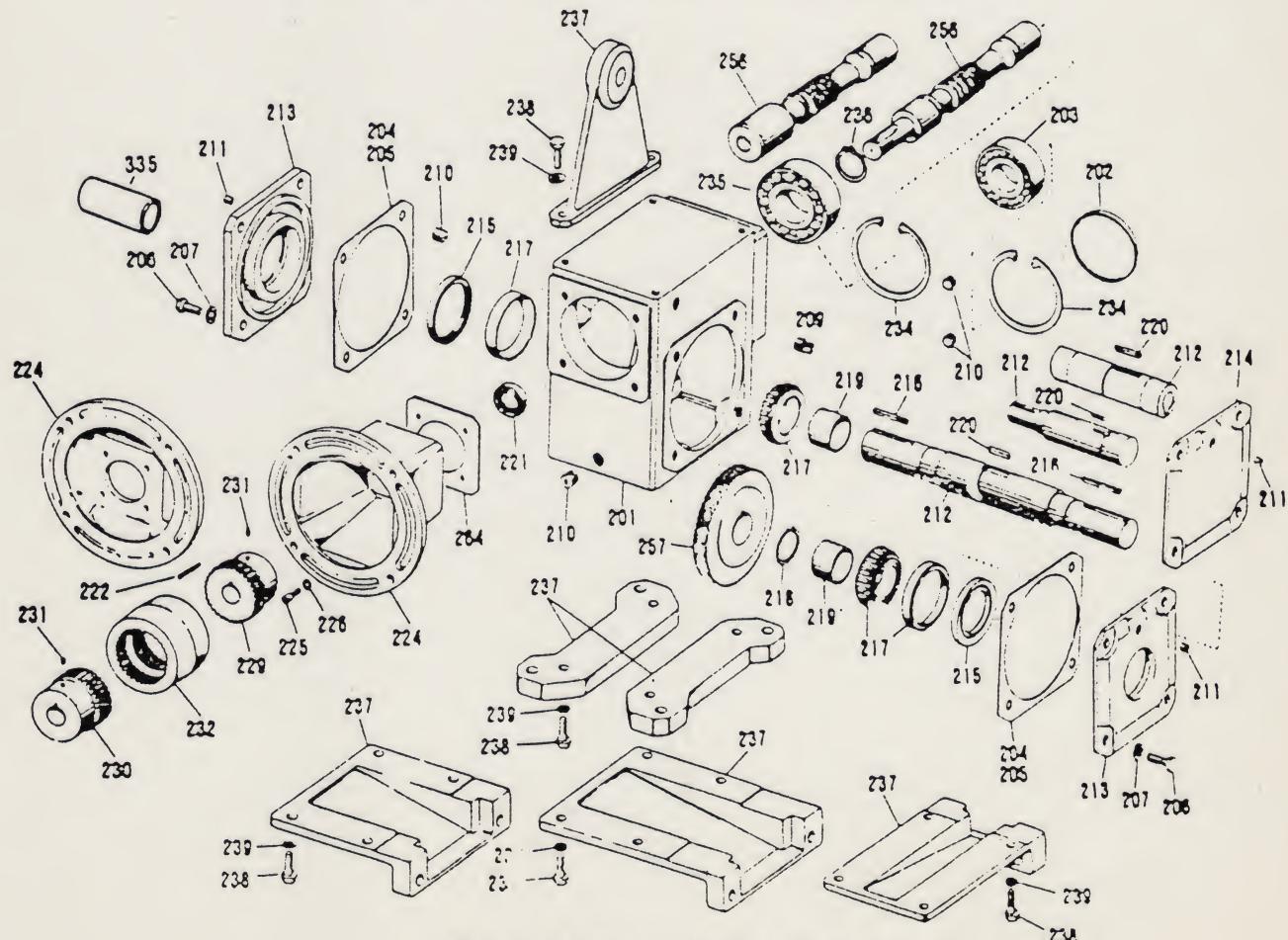
H.P.	RPM	VOLTS	AMPS	L	1/2	1/2
1/2	1725	90	5.35	10 3/4	CONT.	
3/4	1725	90	8.1	12 3/4	CONT.	
1	1725	90	10.6	14 3/4	CONT.	



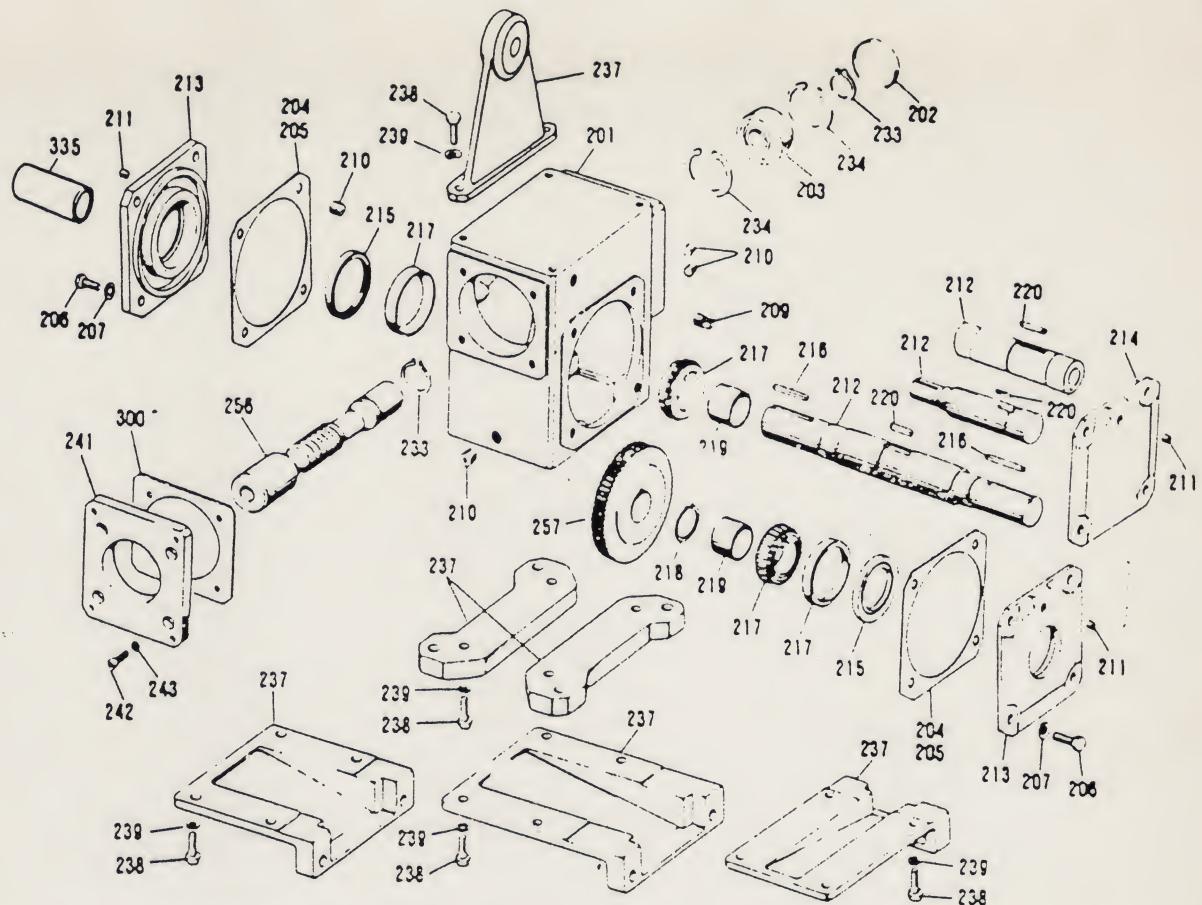
in units fill and vent each unit to



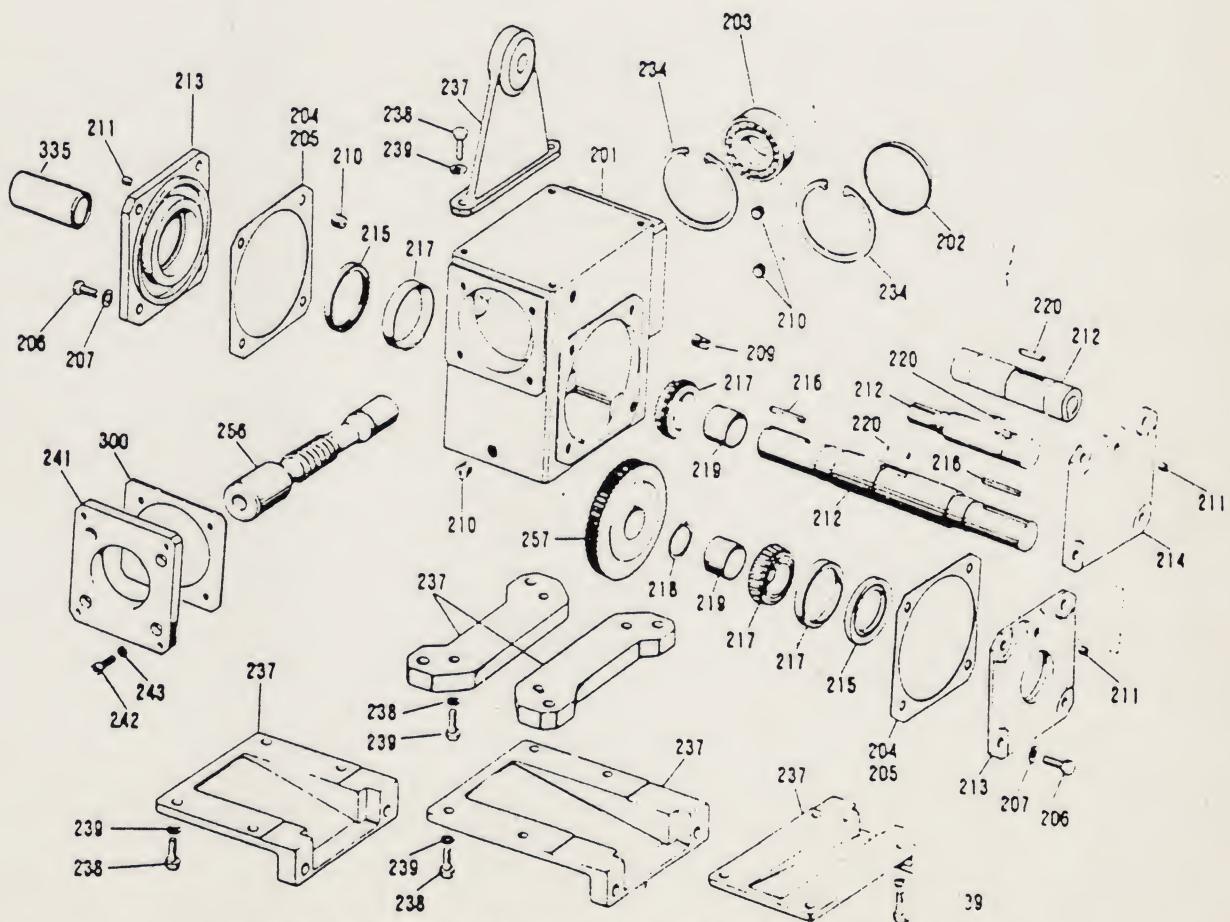
Single Reduction Unit 133, 175, 206 Series



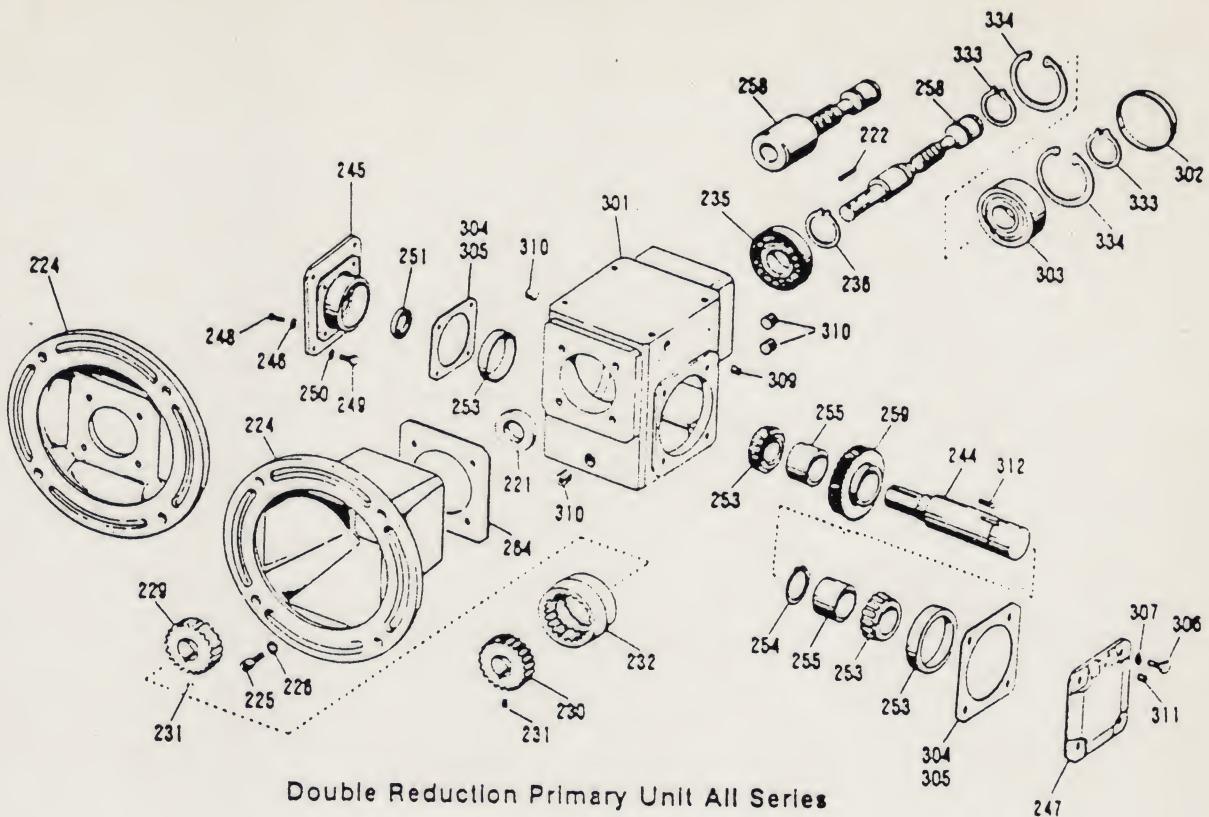
Single Reduction Unit 262, 325 Series



Double Reduction Secondary Unit 133, 175, 206 Series



Double Reduction Secondary Unit 262, 325 Series



Double Reduction Primary Unit All Series

PARTS LIST
(Applies to all exploded views)

ITEM	DESCRIPTION	ITEM	DESCRIPTION	ITEM	DESCRIPTION
201	Housing	229	Coupling Hub (Unit)	255	Spacer
202	End Cover	230	Coupling Hub (Motor)	256	Worm
203	Bearing	231	Setscrew	257	Gear
204	Shim (.019 Thick)	232	Coupling Sleeve	258	Worm
205	Shim (.007 Thick)	233	Lock Ring	259	Gear
206	Capscrew	234	Lock Ring	260	Thrust Plate
207	Lock Washer	235	Bearing	261	Capscrew
209	Vent Plug	236	Lock Ring	264	Gasket
210	Pipe Plug	237	Base	300	Gasket
211	Pipe Plug	238	Capscrew	301	Housing
212	Output Shaft	239	Lock Washer	302	End Cover
213	Seal Cage	241	Secondary Adaptor	303	Bearing
214	End Cover	242	Capscrew	304	Shim (.019 Thick)
215	Oil Seal	243	Lock Washer	305	Shim (.007 Thick)
216	Key	244	Primary Output Shaft	306	Capscrew
217	Bearing	245	Primary Adaptor	307	Lock Washer
218	Lock Ring	246	Lock Washer	309	Vent Plug
219	Spacer	247	End Cover	310	Pipe Plug
220	Key	248	Capscrew	311	Pipe Plug
221	Oil Seal	249	Capscrew	312	Key
222	Key	250	Lock Washer	333	Lock Ring
224	Motor Flange	251	Oil Seal	334	Lock Ring
225	Capscrew	253	Bearing	335	Shaft Cover
226	Lock Washer	254	Lock Ring		

Note: When ordering replacement parts, specify model number, item number, and part description.